# IV Module – Open Science and PhD thesis

1. Open Science and data management. Institutional repositories for the outputs of research.

2. Management of PhD theses

Thursday 11th June 2020, 9.30-12.30

Michela Zorzi - OA Support Group of the UniPd Library System

#### **Open Access**



"Open access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions"

Open

Access

Peter Suber (2012), Open Access, MIT Press https://cyber.harvard.edu/hoap/Open Access (the book)

OA refers particularly to academic, technical and scientific contents

It is a type of (open) access to digital content

It is NOT a business model, a type of license or content!

There are several <u>editorial models</u> and licenses compatible with OA, in constant evolution

Any type of digital content can be openly accessible

#### **Open Data**



Open Data are online, free of cost, accessible data that can be used, reused and distributed, provided that the data source is attributed.

Open Data

It is the philosophy of Open Access applied to data

Data are open when **anyone can access, use and share**.

Examples:

- government open data (e.g. open by default according to the <u>Italian Digital</u> <u>Administration Code</u>)

- research data available to citizens

#### **Open Science**



FOSTER consortium

#### "Open science is the movement to make scientific research, data and dissemination accessible to all levels of an inquiring society"

Open **Open Data** Science **Open Source Open Methodology Open Peer Review Open Access Open Educational Resources** 

Andreas E. Neuhold – Opera propria – CC BY 3.0



**Open Science Taxonomy** 



FOSTER consortium – <u>Open Science taxonomy</u> – <u>related article</u>



#### HORIZON 2020

- One of the largest program carried out by the EU for Research and Innovation;
- nearly 80 billion euros of funding were made available for a 7-year period (2014-2020)
- the aim is to ensure that Europe produces world-class science and technology, removes obstacles to innovation and facilitates collaboration between the public and private sectors to find solutions to the great challenges of our society.



#### HORIZON EUROPE 2021-2027

- Horizon Europe 2021-2027 is the European Framework Program for Research and Innovation for the period 2021-2027;
- with a budget of around 100 billion euros, it is the most ambitious research and innovation program ever;
- based on the success of the Horizon 2020 experience, the new Framework Program will continue to support and promote scientific excellence in Europe fostering, among other forms and models of funding, the open science policy for a better dissemination of results.



## **European Union:**

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- <u>COMMISSION RECOMMENDATION (EU) 2018/790 of 25 April</u> 2018 on access to and preservation of scientific information
- DIRECTIVE (EU) 2019/1024 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 June 2019 on open data and the re-use of public sector information



#### UE Directive 2019/1024

• Art. 28:

"Open access is understood as the practice of providing online access to research outputs free of charge for the end user and without restrictions on use and re-use beyond the possibility to require acknowledgement of authorship. Open access policies aim in particular to provide researchers and the public at large with access to research data as early as possible in the dissemination process and to facilitate its use and re-use. Open access helps enhance quality, reduce the need for unnecessary duplication of research, speed up scientific progress, combat scientific fraud, and it can overall favour economic growth and innovation. Beside open access, commendable efforts are being made to ensure that data management planning becomes a standard scientific practice and to support the dissemination of research data that are findable, accessible, interoperable and re-usable (the FAIR principle)."

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OpenAIRE webinar: Horizon 2020 Open Science Policies and beyond, October 22nd, 2019 by Emilie Hermans (Ghent University) <u>https://www.slideshare.net/OpenAIRE\_eu/horizon-2020-open-science-policies-and-beyond-with-emilie-hermans-openaire</u>

#### EOSC – European open Science Cloud



European Open Science Cloud **EOSC** is a virtual environment launched on 23.11.2018 in which data producers, service providers and innovators will meet.

European research will move from EOSC, and it will be collaborative, open and efficient.

EOSC will be based on the reuse of data, which will have to be FAIR (Findable, Accessible, Interoperable, Reusable).

In 2018 two Reports were published:

<u>«Prompting an EOSC in practice»</u> which deals with the rules for participation in EOSC, the analysis of the beneficial costs - in which the cost of not having FAIR data (10 billion) must be considered - and the governance scheme.

«<u>Turning FAIR into reality</u>» which provides practical guidance on how to create a FAIR ecosystem for research, as open as possible.



#### Open Access at the University of Padova





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Dichiarazione di Messina (2004)

- <u>Statuto, Titolo III, Art. 56, Comma 3</u>
- Policy sull'Accesso Aperto (Open Access) alla letteratura
  <u>scientifica</u> (Senato Accademico, 8 giugno 2015)
- <u>Regolamento per l'Accesso Aperto alla produzione</u> scientifica di Ateneo (Senato Accademico, 11 luglio 2017)
- <u>Policy sulla gestione dei dati di ricerca</u> (Senato Accademico 19 novembre 2018. In vigore dal 1 dicembre 2018)



#### Open Data @ UniPD

The 1° December 2018 the Policy on the management of research data of the University of Padova entered into force.

#### WHO WHAT

"This policy applies to all University research projects limited to the parts for which the University is responsible. Staff people are required to observe it".

#### WHERE

"Research data must be archived into the digital repository of the University of Padova called Research Data Unipd, or into a digital repository that complies with international standards".

#### HOW

"Data must be stored correctly, completely, respecting their integrity. They must also be accessible, identifiable, traceable, interoperable and, where possible, available for subsequent use (FAIR principles)".

#### What are research data?



Recorded information (regardless of the form or the media in which they may exist) necessary to support or validate a research project's observations, findings or outputs



#### Raw data, primary data

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Raw data have been collected or generated in the course of research, but have not been analysed or manipulated yet.

Primary data have been collected in the first person through direct observation, recording, measurement.



https://www.pexels.com/it-it/foto/acqua-ambiente-concentrarsi-crescita-531428/

#### General categories of data



#### **Derived or compiled:**

Derived data involves using existing data points to create new data (e.g. compiled databases, text or data mining); reproducible but expensive



**Observational:** Observational data are captured through observation of a behavior or activity (e.g. sensor readings, survey instruments); usually irreplaceable and not replicable

**Experimental:** Experimental data are collected through active intervention by the researcher (e.g. gene sequences, magnetic fields); generally reproducible but expensive





Reference

(e.g. gene sequences databases, chemical structures, portals with spatial data)



**Simulation :** Simulation data are generated by imitating the operation of a real-world process or system over time using computer test models (e.g. climate models); not always replicable

#### Research data examples





#### Research data examples





#### **Reasearch data examples**

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#### Research data lifecycle

Adapted original source: The University of California, Santa Cruz, Data Management LibGuide, *Research Data Management Lifecyc*le, diagram, viewed 15th September 2015 <a href="http://guides.library.ucsc.edu/datamanagement">http://guides.library.ucsc.edu/datamanagement</a>





## Research data lifecycle

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Raw / primary data are collected or generated during the research, but they are not yet analyzed or manipulated.

Data is then processed and analyzed, and they can lead to positive, negative or inconclusive results.

Only a very small part of data collected during a research comes to be included in a publication.



#### Managing research data: 5 steps





#### First step: collect research data





https://cyfar.org/module-4-evaluation-design-and-implementation

## Second step: file name strategy

A file name is the principal identifier of a file

- File name should help to identify the content of the file.
- Good file names provide useful clues to the status and version of a file, uniquely identify a file and help in classifying and sorting files

File naming strategy should be consistent in time and among different people

- File naming should be systematic and consistent across all files in the study
- A group of cooperating researchers should follow the same file naming strategy.

https://www.cessda.eu/Training/Training-Resources/Library/Data-Management-Expert-Guide/2.-Organise-Document/File-naming-and-folder-structure



#### File name strategy ...



From Propaganda Live, venerdì 27/03/2020, La7

#### Third step: structure research data



Structuring your data files in folders is important for making it easier to locate and organize files and versions.

The decision on how to organize your data files depends on the plan and organization of the study. All material relevant to the data should be entered into the data folders, including detailed information on the data collection and data processing procedures.



https://www.cessda.eu/Training/Training-Resources/Library/Data-Management-Expert-Guide/2.-Organise-Document/File-naming-and-folder-structure

## Fourth step: annotate using metadata



Metadata means "data about data".

It is defined as the data providing information about one or more aspects of the data and it is used to summarize basic information about data, which can make easier to track and work with specific data.



http://www.ucl.ac.uk/library/research-support/research-data/best-practices/guides/creating

#### Fifth step: file formats

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When preparing to collect research data, you should chose **open**, **welldocumented** and **non-proprietary formats** wherever possible.

## The choice of format will vary depending on how you plan to analyze, store and share your data.

It is advisable to store your data for use in future, which means to convert them from a current data format to a long-term preservation format. Most software applications offer export or exchange formats that allow a text-formatted file to be created for importing into another program.



Guides on <u>formats</u>

**<u>Recommended</u>** formats

#### Organize data: dataset versions

Versioning is important for long-term research data management where metadata and/or files are updated over time.

It is used to track any metadata or file changes (e.g., by uploading a new file, changing files structure, adding or editing file metadata...) once a dataset has been published.



http://guides.dataverse.org/en/latest/user/dataset-management.html

#### Storage and preservation



Data **storage** in safe archives adhering to relevant standards.

Preservation actions should ensure that data remains authentic, reliable and usable while maintaining its integrity



Checklist for storage and preservation



The Expert Tour Guide on Data Management by CESSDA ERIC is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

## Privacy, sensitive and personal data

Research data may contain information about living, identifiable individuals, or other information that is sensitive, for example about criminal justice or national security. You are responsible for ensuring that your handling of all these data is secure and compliant with laws and regulations.



## Privacy, sensitive and personal data

## Before you collect data



- Make a risk assessment
- Choose which data to collect, ensuring compliance with the minimization principle

I Ves

 Prepare informed consent, with information on: research, data sharing and conservation, subjects involved, rights of the interested party

## Privacy, sensitive and personal data





# After data collection

 Protect IDs (eg. with pseudonymisation, or retaining information that allows identification in a separate archive)

- Anonymize whenever possible
- Aggregate data
- Regulate access where necessary

## **General Data Protection Regulation**



Since 25 May 2018, the <u>General Data Protection Regulation</u> (GDPR, European Union, 2016) applies to any EU researcher who collects personal data of living persons.

So, when processing personal data, researchers should adhere to the following six principles:

I. Process lawfully, fair and transparent

II. Keep to the original purpose

III. Minimise data size

IV. Personal data should be accurate and, where necessary kept up to date

V. Remove data which are not used

VI. Ensure data integrity and confidentiality

#### Licenses for Open data




# Planning data management

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To be decided at the beginning of a project

Which data to preserve? In which formats?Where preserving data?

Are there **costs** for preservation? (If yes, are they eligible inside research projects?) Which data do I **want** to make accessible? Which data do I **have** to make accessible? © Institute of Physics and IOP Publishing Limited https://cerncourier.com/data-preservation-is-a-journey/



# **DMP: Guidelines & tools**



#### **DCC = Digital Curation Centre**

- <u>http://www.dcc.ac.uk/resources/data-management-plans</u>
- <u>http://www.dcc.ac.uk/resources/tools</u>
   <u>-and-applications</u>

#### DMPTool

 <u>https://blog.dmptool.org/2018/02/27/</u> new-dmptool-launched-today/



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#### Italian Open Science Support Group

- Italian checklist
- <u>http://bibliotecadigitale.cab.unipd.it/b</u> <u>d/per\_chi\_pubblica/documenti-e-</u> <u>materiali/Grigliapianodigestionedatiric</u> <u>erca.pdf</u>

#### OpenAIRE

 <u>https://www.openaire.eu/what-isa-</u> <u>data-management-plan-and-how-do-i-</u> <u>create-</u>
 <u>create-</u>
 <u>create-</u>

one?highlight=WyJob3ciLCJ0byIsImNy ZWF0ZSIsImRtcCIsImRtcCdzliwiaG93IH RvliwiaG93IHRvIGNyZWF0ZSIsInRvIGN yZWF0ZSJd





#### Canadian Association of Research Libraries (CARL)

<u>Portage</u>

#### **Tools for researchers**

- UniPD Ufficio Ricerca Internazionale
- Strumenti per la progettazione e il proposal writing
- <u>https://elearning.unipd.it/ufficiservizia</u> <u>pplicazioni/course/view.php?id=112</u> (with SSO)



# Data citation



Data citation refers to the practice of providing a reference to data in the same way as researchers routinely provide a bibliographic reference to outputs such as journal articles, reports and conference papers.

https://www.ands.org.au/working-with-data/citation-and-identifiers/data-citation

Expert tips:

Deposit your data in a data repository
 Register for an ORCID iD
 Check how FAIR your data are
 Include persistent identifiers



https://www.cessda.eu/Training/Training-Resources/Library/Data-Management-Expert-Guide/6.-Archive-Publish/Publishing-with-CESSDA-archives/Citingyour-data

# **FAIR principles**





# **FAIR** principles





https://www.ands.org.au/working-with-data/fairdata/training Entire FAIR resources graphic is licensed under a Creative Commons Attribution 4.0 International License

# Why is it important to manage research data [properly] and make them OPEN?





To allow the continuity of research through the use of secondary data



To increase the efficiency of research

To ensure compliance with the requirements set by funders



To facilitate data security and minimize the risk of data loss





To guarantee the integrity of research and the validation of the results



To ensure greater dissemination and greater impact For each minute of planning at the beginning of a project, you'll save 10 minutes of headache later



https://pxhere.com/it/photo/764674

# **Research Data Unipd**



#### Research Data Unipd

is a platform for long-term management and archiving of research data and for the access and reuse of data necessary to validate the results of scientific publication It is already equipped with:

\*Authentication via the University's SSO;

\*DOI attribution;

\*Connection between dataset and articles from the publisher's website or deposited in Padua Research Archive;

\*ERC subjects.

It allows the self-archiving of datasets of any format with FAIR mode (Findable, Accessible, Interoperable, Reusable), as recommended by the European Commission.

### http://researchdata.cab.unipd.it/

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Unipa	About the Repository
Home About Research Data Policy	About Research Data Unipd
Login	Research Data Unipd supports research produced by members of the University of Padova. The service aims to facilitate data discovery, data sharing, and reuse as required by funding institutions (eg. European Commission).
	Quality
	Datasets published in the Archive have a set of metadata that ensure that data are described and discoverable. Before publication, dataset records are checked by Editors for presence of appropriate metadata.
	Metadata Policy
	All published metadata are released under a CC0 licence.
	Re-using data
	We encourage Researchers to use licences on their datasets to promote reuse of the research data. The licence to be preferred is Creative Commons Attribution 4.0, but several others are used. Any re-use must acknowledge the Creators in an appropriate manner, ideally through a citation similar to that provided with the record.
	Recommended formats and data files
	Formats and data files.
	Submission policy
	Submission policy concerning depositors, quality & copyright.
	Data deposit agreement
	Agreement to terms and conditions.



### Data deposit agreement

When you deposit data in the Research Data Unipd Archive, you will need to agree to the conditions below. This is done by clicking the "Deposit" button in the archive, before depositing the item.

This agreement confirms that you, the depositor, have the right to submit the dataset to the repository.

This agreement ensures that the archive administrators have the right to carry out activities necessary to facilitate the long-term preservation and sharing of datasets.

By submitting your dataset for deposit, you grant a non-exclusive licence to the University of Padova to archive, publish and disseminate any material within the dataset. The licence is non-exclusive, and therefore does not prevent you exercising any rights you might have to publish and distribute any of the dataset, in its present or future versions, elsewhere.

### A dataset





### Additional details and info on files

	Creators	E	mail		ORCID		
Creators/Authors:	Zane, Antonella		zane@unipd.it <sup>(D)</sup> orcid.or		rg/0000-0001-7218-606		
Type of data:	Text						
	Contri	bution	Name		Email		
Contributors:	Editor Editor		Chavarria Arnau, Alexandra		UNSPECIFIED		
			Brogiolo, Gianpietro		UNSPECIFIED		
Collection	From	То					
period:	1999	2000					
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### Licenses to promote the reuse of data

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If the dataset is mainly composed of text

Audio If the dataset is mainly composed of audios

#### O Video

If the dataset is mainly composed of videos

Image

If the dataset is mainly composed of images

#### Model

If the dataset is mainly composed of models

#### Software

If the dataset is mainly composed of software

#### Code

If the dataset is mainly composed of code

#### Machine/Instrument Log If the dataset is mainly composed of Machine/Instrument log

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If the dataset is composed by mixed types

#### Other

If the dataset is mainly composed of other types not listed



### **Funders fields**

Research Funders		
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### Link to articles in publishers' websites or in Padua Research Archive (IRIS)

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### Licence to store and disseminate

Upload -> Details -> Subjects -> Deposit

For work being deposited by its own author: In self-archiving this collection of files and associated bibliographic metadata, I grant Research Data Unipd the right to store them and to make them permanently available publicly for free on-line I declare that this material is my own intellectual property and I understand that Research Data Unipd does not assume any responsibility if there is any breach of copyright in distributing these files or metadata.

Clicking on the deposit button indicates your agreement to these terms.









### International registries of Open Access repositories

Research Data Unipd is indexed to <u>re3data.org</u> e <u>OpenDOAR</u>







### Make your content count with OpenAIRE

**Research Data Unipd** is also registered as **Content Provider of OpenAire** (Open Access Infrastructure for Research in Europe), an infrastructure financed by the European Commission with the aim of collecting and disseminating the results of research (publications and data) financed with public funds.



# Open Data @ UniPD



# Need a help?





Michael Sauers <a href="https://www.flickr.com/photos/travelinlibrarian/223839049">https://www.flickr.com/photos/travelinlibrarian/223839049</a>



### Library System support services

In the section "<u>About publishing</u>" of the Library System web portal, researchers will find information on Open Access, on publishing, and on the management of data.

#### About publishing

Filed under: digital repositories, open access, self archiving, OAI, license agreement, publication, open archives, publication standards, Impact Factor





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### Library System support services



Authors can submit specific requests using the Library System <u>Help Service</u>, choosing between the following addresses:

- 09 Tesi di dottorato (Padua@research)
- 11 Supporto Open Access (Supporto Ricerca)



Kyle James <a href="https://www.flickr.com/photos/jameskm03/2711755476">https://www.flickr.com/photos/jameskm03/2711755476</a>

### Library System support services



Before and after publishing articles and data, improve your knowledge with:

> Scholarly Communication and principles of Open Science

a Training Course composed by five modules.
It aims to introduce early-career researchers to scientific communication and to the principles of Open Science (Open Access, Open Data, Open Licences).





### OA Support Group of the UniPd Library System



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